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The Fezzan Project 2001: Preliminary report on the fifth season of work

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Abstract

The Fezzan Project completed its five-year fieldwork cycle in 2001. The geographical research team located numerous additional palaeolake sites within the Edeyen Ubari, using a combination of Remote Sensing technology and field visits. Additional samples were taken for analysis and dating from many lake edge locations, relating to both the large Pleistocene lake and to the numerous smaller Holocene lakes that have been identified by the team. The excavations at Old Germa were taken down through Garamantian occupation levels to the natural subsoil below the earliest cultural horizon. The earliest activity, represented by a few mudbrick walls and hearths built directly on the natural soil, is believed to date to c. 400-300 BC. Traces of several phases of Garamantian buildings were uncovered, along with numerous rubbish pits, which yielded a rich assemblage of finds, including, for the first time, examples of Garamantian figurines, small 3-D sculptures of humans and animals. Work on the various classes of finds (pottery, small finds, lithics and other stone artefacts, metallurgical evidence, etc.) complemented the excavation work. In addition, a small amount of further survey work was carried out on sites in the Wadi al-Ajal, along with a contour survey of Old Germa and standing building survey at a number of other sites.

Introduction

The 2001 season marked the culmination of the five-year project, with the excavation reaching the lowest levels of Old Germa (for previous work see Mattingly *et al.* 1997; 1998a/b, 1999, 2000a/b). This report provides a brief overview of the varied programme of work undertaken by the team in this final season of fieldwork. A shorter study season to work on materials from the excavation is planned for January or February 2002. As in previous seasons, the work combined geographical and geomorphological research, archaeological excavation and standing building survey, with an extensive finds programme. The archaeological field survey of a wider area around Germa had essentially been completed in 2000, but a few sites were visited in 2001 to check details and to follow up new information.

Geographical and Environmental Research

Palaeoenvironmental research this season involved field checking of sites in the Ubari and Murzuq Sand Seas interpreted as interdune palaeolakes on the basis of satellite image interpretation, along with collecting further samples for dating. The first major finding

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arising from this approach was that interdune deposits above approximately 530 m amsl were dominated by bedrock, whereas below this height interdunes were dominated by palaeolake sediments capped by duricrusts. Interdune areas with exposed bedrock had relatively few archaeological sites, whereas palaeolake-dominated interdunes were relatively rich in Holocene artefacts and residual Pleistocene lithics. It is clear from combined remote sensing analysis and ground truthing that there were numerous palaeolakes in the southern fringes of the Ubari Sand Sea. The interdune palaeolakes generally consist of three major terraces (Fig. 1), starting with mottled orange and green sands, followed by grey silts, black organic sediments, white silty materials, all of variable thickness, topped with indurated dune sands and/or calcretes. Gypsum crusts were often present capping the lowest lake levels, representing the last stages of drying out of the lake basin. Mollusc shells were often present within the organic sediments, attesting to the presence of fresh to brackish water, and samples of these were collected for Uranium/Thorium dating. At one location (26.73626N, 12.37053E) an antenna tomb constructed from calcrete was found on the upper of the three lake terraces, along with abundant Holocene lithic scatters. This attests to the occupation of these palaeolake sites within the sand sea into the Holocene. We await results of AMS radiocarbon dating of the organic lake sediments and Uranium/Thorium dating of shells to provide a fuller palaeoenvironmental chronology of these interdune palaeolake sites. These discoveries will provide important complementary evidence to the detailed picture built up by the Italian team for the Wadi Tan ezzuft and Acacus area (see Cremaschi, this volume; Cremaschi and Di Lernia 1998).

Apart from work on palaeolakes within the Ubari and Murzuq sand seas, further survey was carried out to locate palaeolake shorelines along the Wadi al-Ajal. Results of Differential GPS survey conducted by LASMO on behalf of the Fezzan Project fixed a previously identified Pleistocene lake level (Mattingly *et al.* 2000a, 103-4; cf. Ziegert 1995, for initial identification of some of the lake edge features) in the Wadi al-Ajal at approximately 495 m amsl. This year a possible higher shoreline was found 30 m above this. Investigations revealed a significant horizon of palaeolake sediments at this height containing *Melanoides tuberculata*, which were sampled for Uranium/Thorium dating. The dates yielded by these samples will provide an indication of the relationship between the palaeolake levels in the Wadi al-Ajal.

The highest palaeolake sediments found in the Wadi al-Ajal were at approximately 560 m amsl, and were found abutting against the edge of the Ubari sand sea at 26.61372N, 12.07889E. These consisted of green sands overlain by white laminated lake sediments capped by calcrete, forming mesas about 4 m above the surrounding surface because of general deflation of ground level. Their position at the edge of the sand sea, and the limited extent of these deposits suggests that this may have been relatively localised lake level controlled by surrounding sand dunes, rather than a major feature of the Wadi al-Ajal.

Field checking of satellite imagery also identified palaeolake sediments around the northern edge of the Murzuk sand sea up to 537 m amsl at 26.03745N, 13.30949E. In this vicinity the lake sediments form extensive terraces associated with abundant archaeology, including Garamantian-type cemeteries. They also attest to the considerable area that would be inundated during the lacustrine high-stands.

A major series of gravel palaeofluvial sediments (gravel bars now forming ridges of inverted relief owing to deflation of surrounding sands) was identified, indicating a palaeo-flow east from the direction of Uweinat. This palaeofluvial system is likely to have provided runoff for palaeolakes in the Wadi al-Ajal around Germa, but the age of these palaeo-gravel bars is unknown. Some palaeochannels are still evident in the



Figure 1. View of palaeolake EDU 005 in the Ubari Sand Sea, showing the remains of three separate terraces of duricrust, representing successive lake stands in this interdune depression. (Photo: T. Savage.)

Synthetic Aperture Radar imagery collected by the Space Shuttle, owing to the presence of *acacias* exploiting the higher groundwater levels along these channels.

Investigations of the terraces of the Wadi ash-Shatti, from which *cardium* shells have been dated by Petit-Maire *et al.* (1980) at between 90 ± 2 and $163 \pm 20-15$ ka BP, showed these to be approximately 150 m lower than the 495 m amsl lake level determined for the Wadi al-Ajal. We also re-dated *cardium* shells from these terraces using modern correction techniques applied to the Uranium/Thorium method, yielding dates of $43-47 \pm 5$ ka BP, much younger than previously thought. On the basis of differences in age and elevation, we conclude that the palaeolake sediments previously identified in the Wadi ash-Shatti are not directly related to any lake sediments so far identified in the Wadi al-Ajal. As the Wadi ash-Shatti system is fed by a lower aquifer than the Wadi al-Ajal system, there is no particular reason why the two systems should have responded contemporaneously to changes in palaeohydrology.

Excavations

The final season of excavations at Old Germa

The aims of the final season of excavations at Old Germa were to excavate much of the trench to a consistent low level, to reach natural in as large an area as possible and to complete the study and re-interpretation of the Daniels' trenches in the Garamantian temple (Daniels 1989, 52). These aims were successfully completed over a five-week period, with 4-7 trench supervisors and up to 14 local workmen.

The first task at the beginning of the season was the removal of the remnants of Phase V features (for phases I-IV, see Mattingly *et al.* 1997; 1998b; 1999; 2000a). Phase V seems to lack a coherent architectural plan and is associated with a series of ashv tin

layers, in-filling the standing Phase VI buildings and courtyards. This seems to represent a period when this part of Old Germa was unoccupied, although nearby areas presumably were.

Phase VI, by contrast, provides us with a reasonably full architectural plan across much of the trench (Figs 2-3). In the northern area, a large east-west orientated room, Rm. 6.2, opens off an enclosed courtyard area. This room measures 5.65 m by 3.3 m and seems to have had two major sub-phases of use. Both sub-phases are associated with a well, in the southeast corner of the room. This is the same well which was originally found in 1998 in a Phase III building (Mattingly *et al.* 1998b), but which had clearly existed on the site from earlier phases of occupation, with subsequent re-cuttings and re-linings as subsidence and the build-up of deposits required. The room is dominated by a central hearth, with a thin and low U-shaped mud brick surrounding wall, the latter possibly demarcating some significant social division of space or acting as a protective barrier around the hearth. This U-shaped lay-out of the room is reminiscent of several structures excavated by C. M. Daniels at Saniat Gebril (Daniels 1971, 6-7). There is another enigmatic mudbrick structure to the north and a plaster-lined, lipped work area in the north-west corner. A preliminary review of the pottery suggests a fourth-/fifth-century AD date for this structure.

A doorway leads from Rm. 6.2 to a smaller room in the east, Rm. 6.1, which measures 2.2 m by 2.35 m. This room lacked features and may represent a storeroom. Remnants of plaster on both walls and floors suggest a greater aesthetic quality in the Phase VI structures—little evidence of plaster was noted in Phases I-V. To the south lay a third small room, Rm. 6.3, opening onto an open ‘working area’ in the west, where a hearth and a series of intercut ash pits were found. The hearth is associated with a surface and wall to the north and a linear mud brick feature was noted further to the north

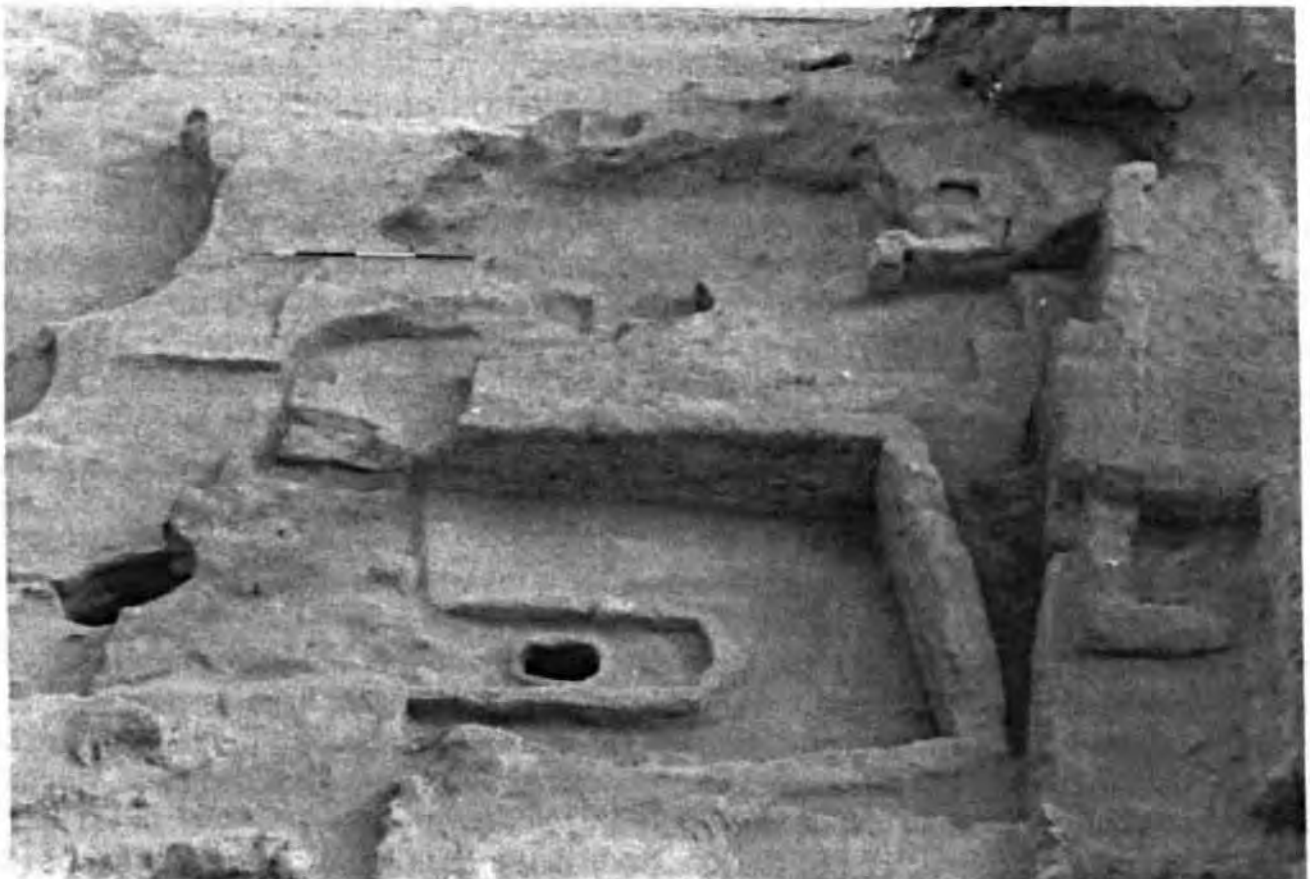


Figure 2. General view of G1 excavations showing the Phase VI Garamantian house with a well and U-shaped hearth surround. (Photo: D. Thomas.)

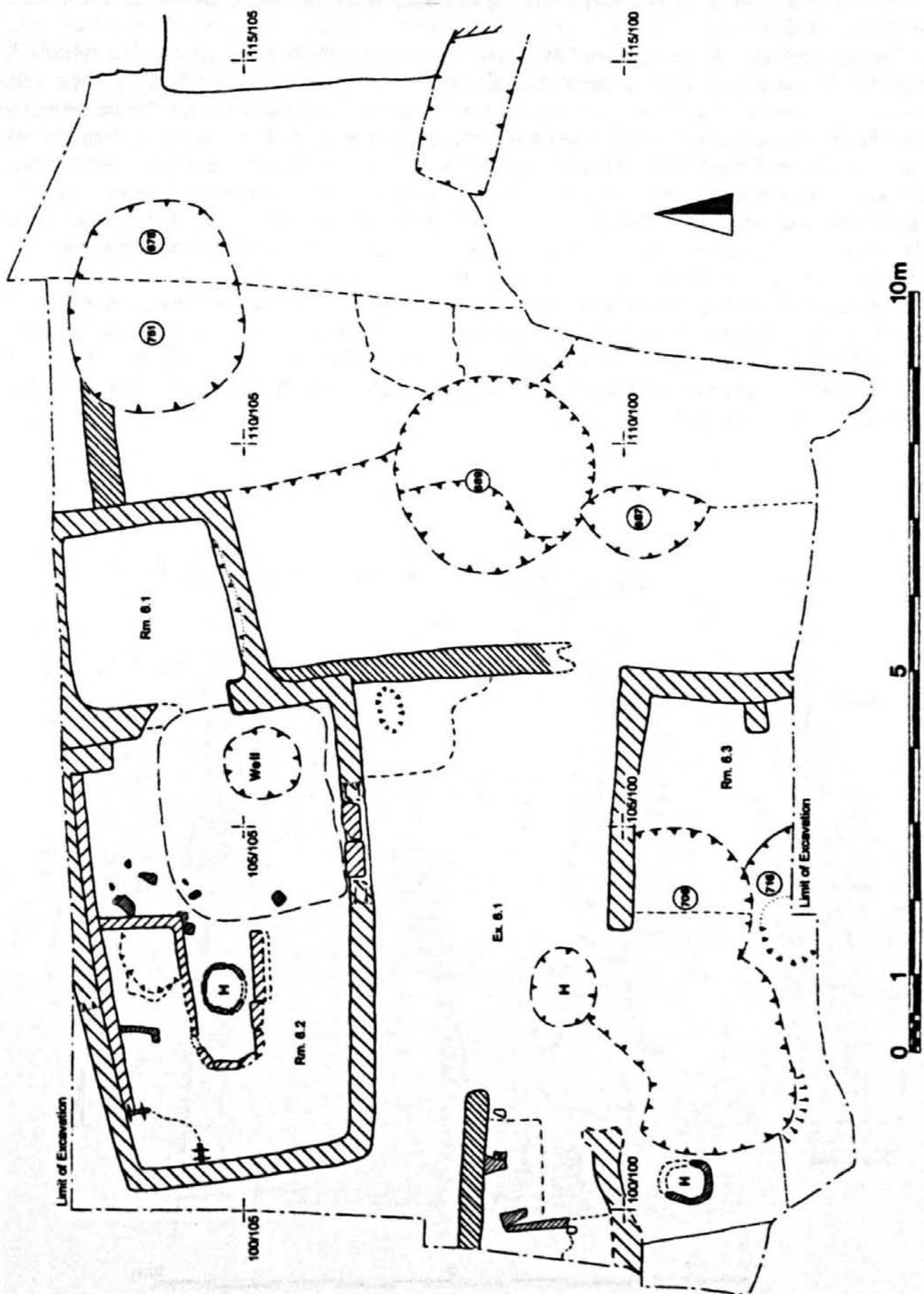


Figure 3. Plan of Phase VI buildings.

in the courtyard area. This is remarkably in keeping with the use of this area of the trench from Phase II down.

A major period of pit-cutting and use separates Phases VI and VII, which has detrimentally affected our understanding of Phases VII and VIII. It seems clear, however, that these phases are associated with the two main phases of the Garamanian temple (Fig. 4). A wide area of level brick packing seems to have been laid to the west of the temple in Phase VII, possibly in response to a higher watertable and localised boggyess), as well as the desire to have an impressive circulatory space around the temple. The pits have provided us with a wealth of pottery, small finds, faunal and archaeobotanical data and the first evidence of both animal and anthropomorphic clay figurines from the Garamanian period (see below).

What remains of the architecture points to a sequence of major buildings just to the north of our excavation area, in both Phase VII and what appear to be two sub-phases of Phase VIII. A series of plastered floors was excavated in a narrow space along the north baulk, whereas in previous phases, the builders used truncated earlier walls as foundation footings for later walls.

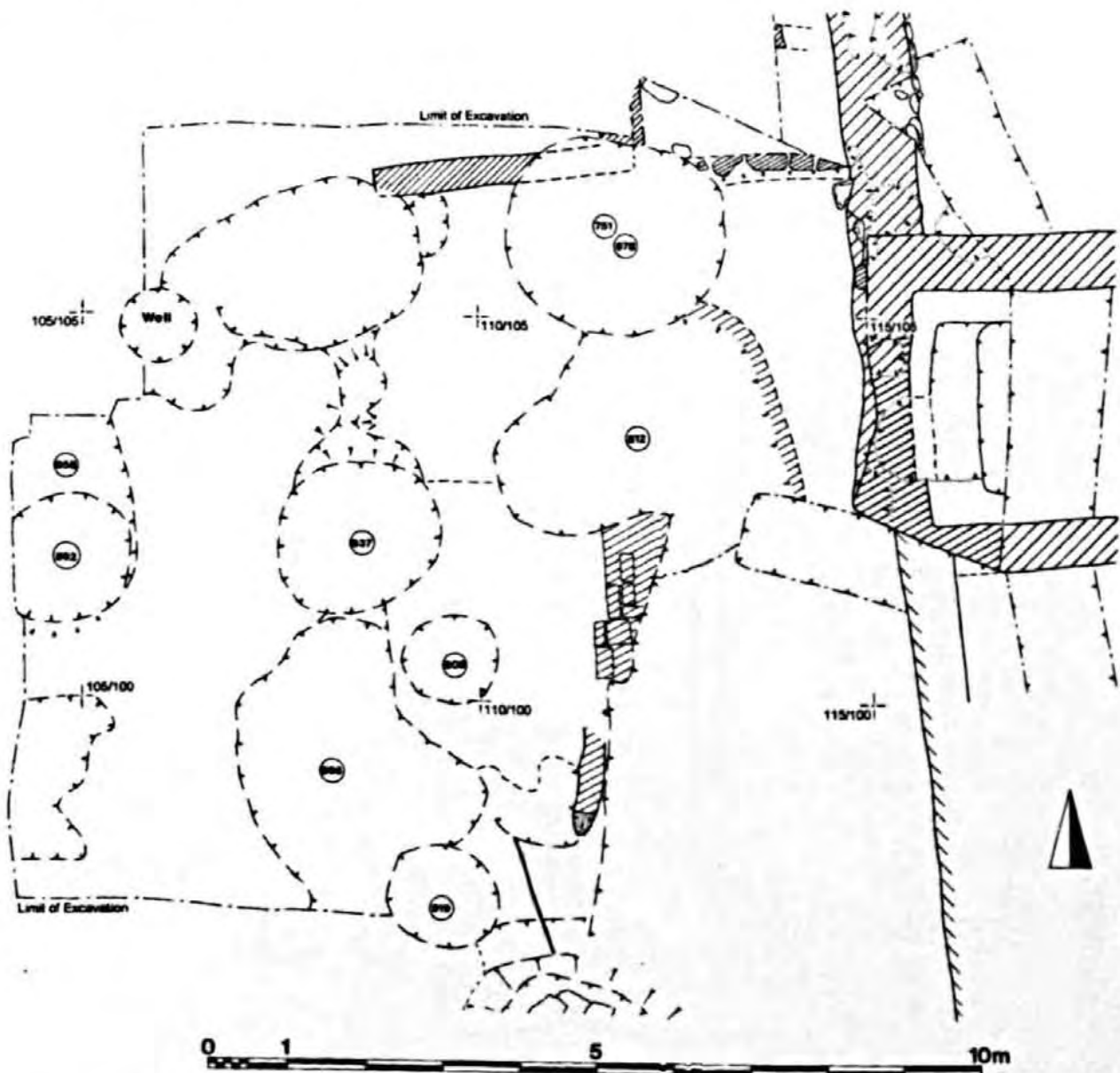


Figure 4. Plan of Phase VI/VII pits and vestigial traces of earlier buildings. The W side of the temple is visible at the right side of the figure (cf. Fig. 5).

Phase VIII is distinctive because of its very compact, large, white rectangular mud bricks, along with more conventional mud bricks. In addition to the corner of the major building in the north, a north-south wall line was found parallel to the west wall of the temple, with a return to the west. This wall was heavily truncated when the Phase VII courtyard packing was laid.

In the lowest levels of the main excavation area, just above natural, short stretches of Phase IX and X walls and floors were noted. The Phase X mudbrick buildings provide the earliest evidence of human activity at Germa and may well conform with an AMS date obtained from the lowest level below the nearby building 4, suggesting an origin in the fourth-third centuries BC. A major mud brick wall runs east-west in Phase X; these ephemeral phases are associated with pits and features, including a probable hearth cut into the natural, and hundreds of carnelian flakes. This is in keeping with the nature of deposits found above natural in the soundings within and below the temple, where one pit in particular was full of carnelian flakes and another pit contained a large, probably Punic, glass bead—in combination they perhaps provide an echo of Pliny's reference (NH

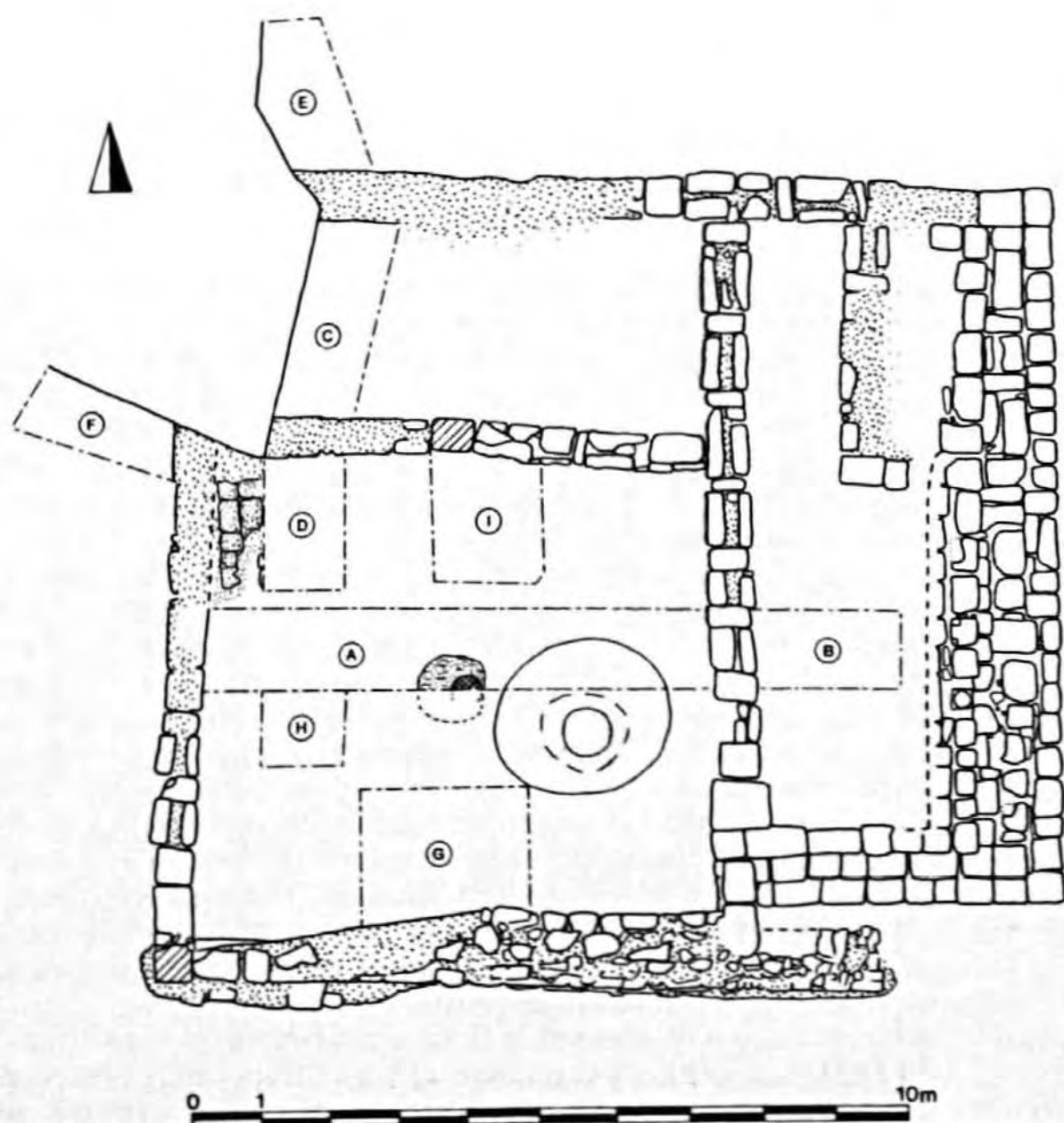


Figure 5. Plan of temple GER 001.003, showing trenches A-G (excavated by C.M. Daniels and H-I (excavated by the Fezzan Project). (From Daniels, with additions.)

37.25.92) to the Garamantian red stones ('carbuncles') as 'Carthaginian stones' (that is, obtained by Rome originally through trade with Carthage, who in turn were trading with the Garamantes).

In order to link the stratigraphic sequence from site G1 to the earlier sondages of Daniels below the temple (GER 001.003, Fig. 5), we recleaned and recorded his trenches and excavated a small trench through the temple and sub-temple surfaces and foundational deposits down to natural (the recording of this area was designated G4). It is clear that the temple comprised two main phases of construction (probably corresponding to phases VII-VIII on the main site. There was a Phase IX pre-temple building of some pretension (with a stone socle for its east wall and possibly a plan resembling somewhat the later first phase temple). Several Phase X mudbrick walls and features were recognised beneath this building just above natural. Although the base of these deposits is now very dry, it is clear from Ayoub's report (no date, 18; 1967, 24-8) that the water table was still very high in the 1960s and that these levels were semi-saturated. There are indications in the fabric of the temple building and in the attempts to raise the ground level on a succession of compact surfaces that the Garamantes encountered some structural problems when they erected their large-scale public buildings on what was originally a boggy site.

Finally, a Phase II well cut down through the temple was excavated to a depth of over 2 m below natural, before its irregular small stone lining made further excavation dangerous. Similar concerns halted the excavation of a better-constructed well to the west of the temple, on the edge of our excavation area, once again of probable Phase II date (Ayoub's excavations had isolated the preserved lining from the G1 excavation area at higher levels). This well was built of large stone blocks (possibly re-used from the temple), in a wide cut, then filled with coarse clayey packing. The preserved lined shaft consisted of 37 courses and was at least 6.4 m deep (extending several m below natural). Three human skulls and a canine mandible were found in the lower fill, along with broken pots and a quern stone. The construction of the well is similar to that of one cut from the surface to the southwest of our excavation area; this and the depth of the well point to a late date when the watertable had already fallen considerably below the level of the well in the centre of the main excavation. The latter penetrated only into the very top of the natural subsoil and appears to have been abandoned in Phase III.

Further finds from the G1 excavation area of Roman type ceramic brick and tile, specifically fragments of mortared and fired hypocaust tile and box flue tile, confirm the presence in the close vicinity of a Roman style bath house within the Garamantian capital. Several fragments of good quality painted wall plaster and one fragment of marble wall veneer were also recovered. The significance of this discovery cannot be overstated. Although the exact location of the bath structure has not been identified, the consistent presence of elements of the demolished materials from this building in Garamantian rubbish pits across the G1 site suggest that it stood close by. This is by some distance the most southerly bath building of Roman type in North Africa and suggests some Garamantian emulation of a Mediterranean lifestyle. The logistical, socio-political and economic implications of these specialised building materials, even enough for a small bath, being carried 1000 km across the Sahara are considerable and shed important new light on the aspirations of Garamantian civilisation.

The range of productive activity attested in Garamantian levels is impressive. We have specific evidence of carnelian working (hundreds of waste chips) and of bead production (represented by bead grinders probably used both with ostrich eggshell and semi-precious stones such as carnelian). There is clear evidence of iron smithing and of copper alloy working (with indications that the same hearths were used for both processes).

A series of small ceramic moulds, with traces of copper adhering, appear to be evidence of the casting of small copper ingots, either as a result of primary smelting of copper or (perhaps more likely) of the remelting of copper from larger ingots (there is no evidence of a local source of copper, though copper has for long been an important commodity of Saharan trade; Bovill 1968). There is also evidence of local production of textiles (loomweights), pottery and figurines (see below under *Finds*). The location of this evidence in rubbish pits and occupation deposits close to the very centre of Old Germa shows that these activities were not restricted to satellite villages such as Saniat Gebril.

An innovation of the 2001 work was the use of a kite-borne camera system, developed by Toby Savage and similar to that used on the UNESCO Libyan Valleys Survey, to record details of the excavations at Old Germa (Fig. 6) and a number of other sites.

The examination of a robbed antenna tomb (TWE 044)

A large antenna tomb, whose morphological character (though not its significance) was noted by CMD, was reidentified on the ground on the escarpment to the southeast of Germa. The arms are respectively 27 m+ long aligned 350° and 30 m+ long aligned 110° (Fig. 7). The monument thus faces roughly northeast. The arms are defined by parallel walls of edge-set small blocks c. 1.2-1.5 m apart, though most of these have now been knocked flat, apart from a few stretches of the southeast aligned arm. The interior spaces of the arms were filled with small stones laid flat. The feature at the apex of the two arms comprises a robbed burial at the centre of a low platform of laid blocks (c. 8 m diam.), probably originally with edge-set blocks delimiting it. The central burial had been robbed when CMD saw it in the 1960s (leaving a hole c. 1.70 m diam. × 40 cm deep),

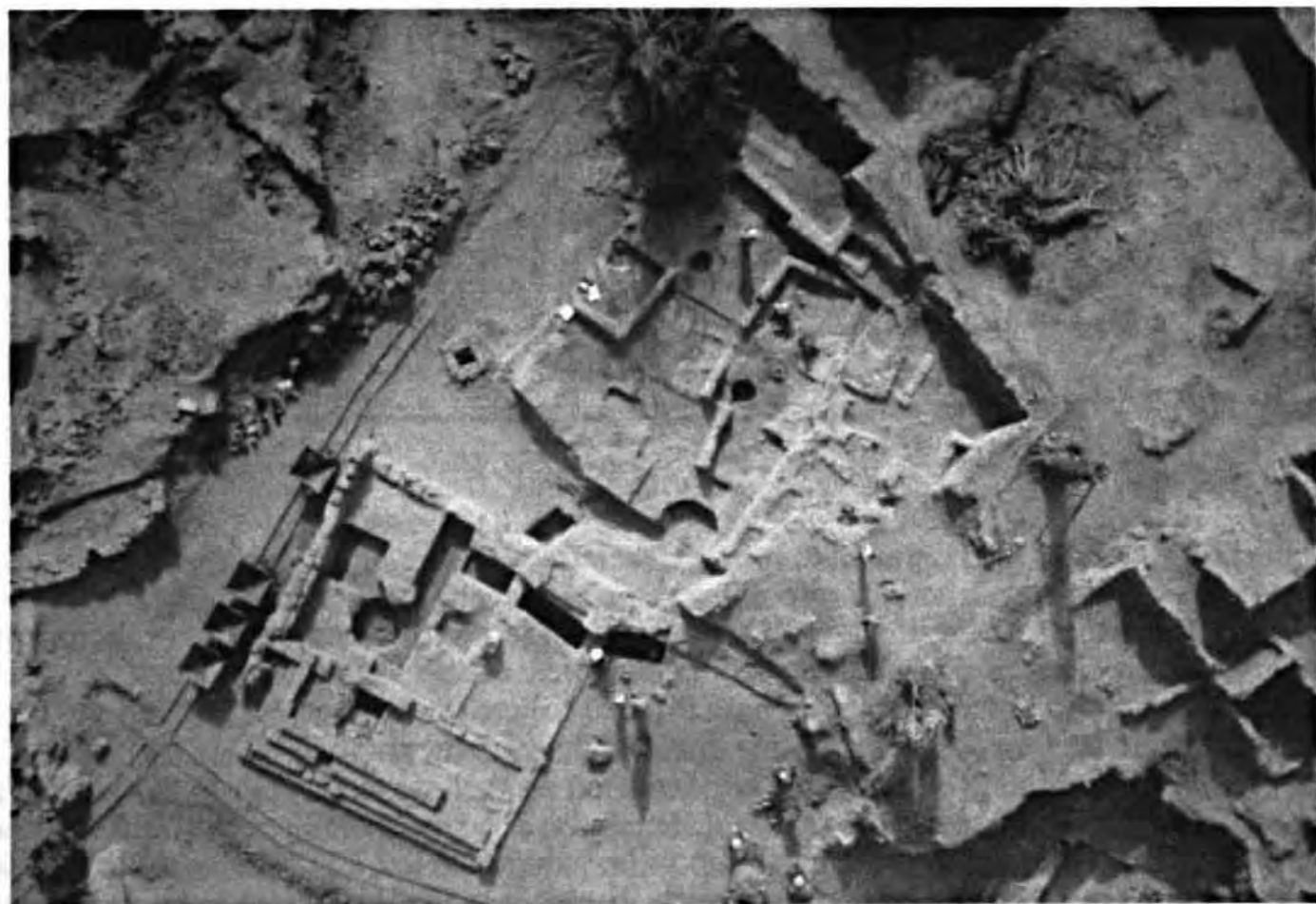


Figure 6. Vertical kite aerial photograph of the excavations at Old Germa, showing site G1 top, with the temple just below. (Photo: T. Savage, J. Orchard.)

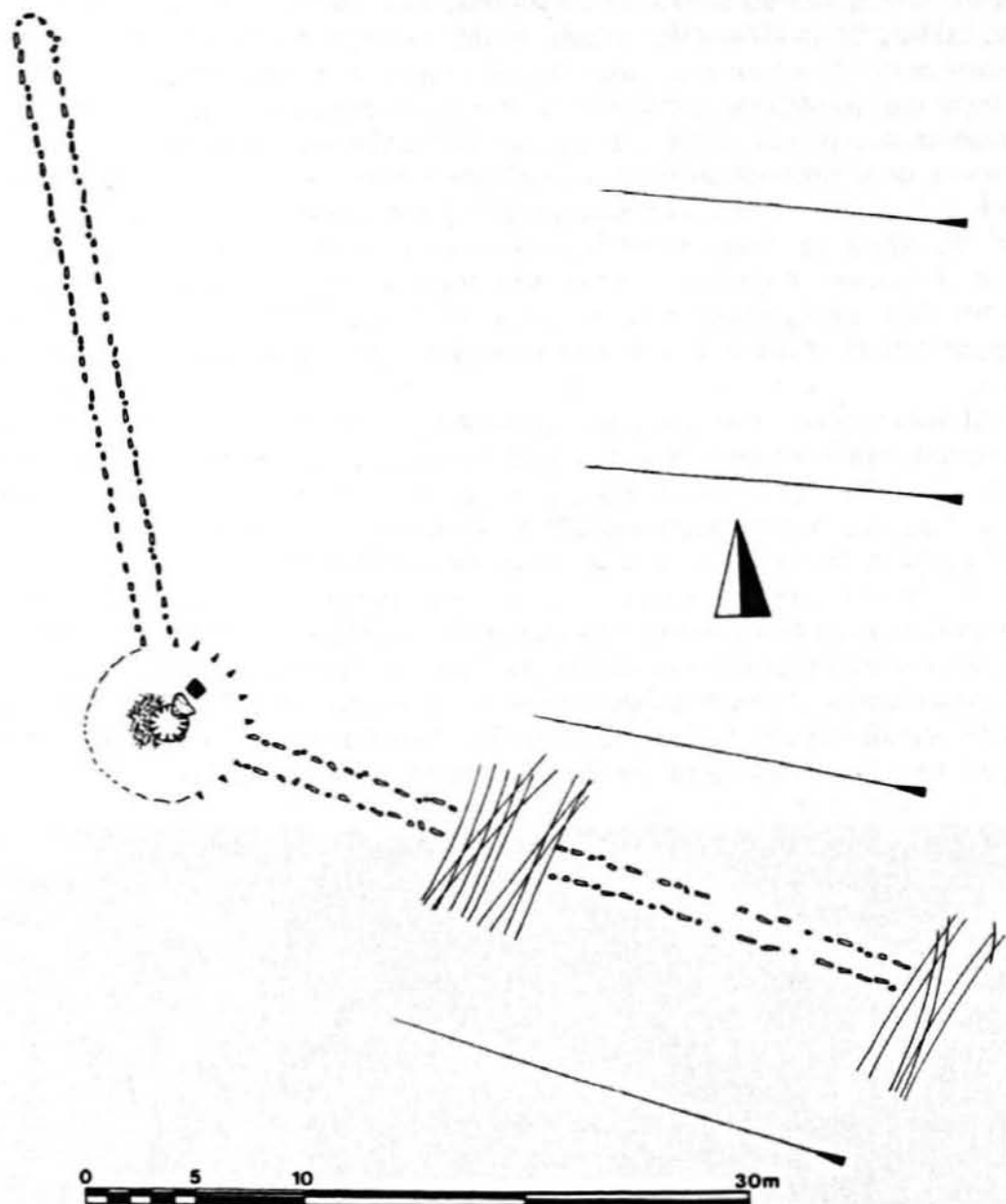


Figure 7. Antenna tomb TWE 044 (the lines cutting through the monument represent modern bulldozer damage).

but examination in 2001 showed that many skeletal elements and some associated finds were still present in the spoil. The spoil heaps from the robbing were carefully sieved and 10 ostrich eggshell beads of Pastoral type (with large perforations) and some holocene lithics were recovered along with various elements of the skeleton of a mature adult male. Although no pottery was present, a bifacial foliate on fossil wood and other flakes and blades are suggestive of a mid-late Pastoral date for the tomb.

The highly fragmented bones can be identified as skeletal elements of an adult male with a lifestyle involving heavy physical demands. The mandible is very robust. There are roots from 2 incisors within the right portion, whilst the left PM2 was lost during life and the mandible shows alveolar resorption. The chin is well developed. All epiphyses present are fused and there is muscle marking on several fragments. There is degenerative joint disease present on several bones.

Field survey and survey of standing structures

Field survey

The work of field survey was essentially completed in the 2000 season. A limited amount of time was spent in 2001 checking specific details and obtaining more detailed information about location, structures, etc. A few key developments merit more detailed consideration here. A significant number of new sites of Pastoral date was recorded in relation to the geographical investigation of the sites of suspected palaeolakes (see the section on lithics, below). Several additional examples of antenna tombs (of presumed late Pastoral date) have been recorded within the survey zone (see above, *Excavations*). A further example of an early Garamantian escarpment site has also been added to the gazetteer of the Gagra area (east of el-Charaig). Another important discovery was the re-identification of a site known in the nineteenth century as Qasr al-Watwat ('Castle of the Bats'), which lay between Old Germa and the well-known Roman style mausoleum (UAT 001), which in more recent times has acquired the soubriquet Qasr Watwat for itself. We had thought that a mudbrick tower and associated settlement adjacent to the Germa to al-Greifia road (GER 009) was a good candidate for this missing site, though the nineteenth-century travellers describe a substantial walled settlement. Air-photographic analysis by David Edwards, researching the Daniels archive (Edwards *et al.* 1999), had suggested a possible alternative location slightly to the northwest and on investigation this proved to be the case. The remains of a substantial set of mud brick fortifications (towers?) and an extensive area of mud brick fragments and pottery in the surrounding gardens indicate a site of several hectares' extent. It evidently has both Garamantian and Islamic phases. Its location, a mere 2 km from Old Germa, is intriguing.

Some additional survey work was also directed at the interpretation of a number of sites where metallurgical slags and non-metallurgical slags had been noted in earlier seasons. At Saniat Gebril (GER 002), the location of more than 70 possible hearths and deposits of ash and/or slag were mapped and a single hearth examined in more detail (Fig. 8). Samples of the waste residues were collected for analysis. A preliminary conclusion is that the same hearth structures may have been used for iron and copper working and possibly also for the process that produced the non-metallurgical slags. A series of other sites on the edge of the salt flat to the north-east of Germa and north of el-Charaig was revisited to check on the occurrence of non-metallurgical slags and iron slag there. The non-metallurgical slags predominate, though some evidence of iron working was also recorded. Some of the samples collected for analysis appear to confirm the interpretation of the non-metallurgical slags as a residue of a salt purification process (Ziegert 1974). One site (TWE 029) is situated out in the middle of the salt flat itself and comprises many hearth-like features. A mass of Garamantian and imported Roman pottery appears to indicate that this was a major salt-producing site of the Garamantian period (on the importance of salt in Garamantian and later Saharan trade, see Bovill 1968; Liverani 2000).

Topographical and Structure Survey

The focus of this season was the systematic topographic survey of Old Germa (Fig. 9). The methodology used was to set up transects at 10 m intervals through the town including the enclosing ditch outside the defensive walls. The resulting contour map has provided valuable elevation data concerning the Garamantian levels and their relationship to the post-Garamantian development of the town. The data demonstrated a greater intensity of occupation in the western sector of the town as reflected by the distinct areas of higher elevation. Indeed, there is a difference in height of 9 m between the

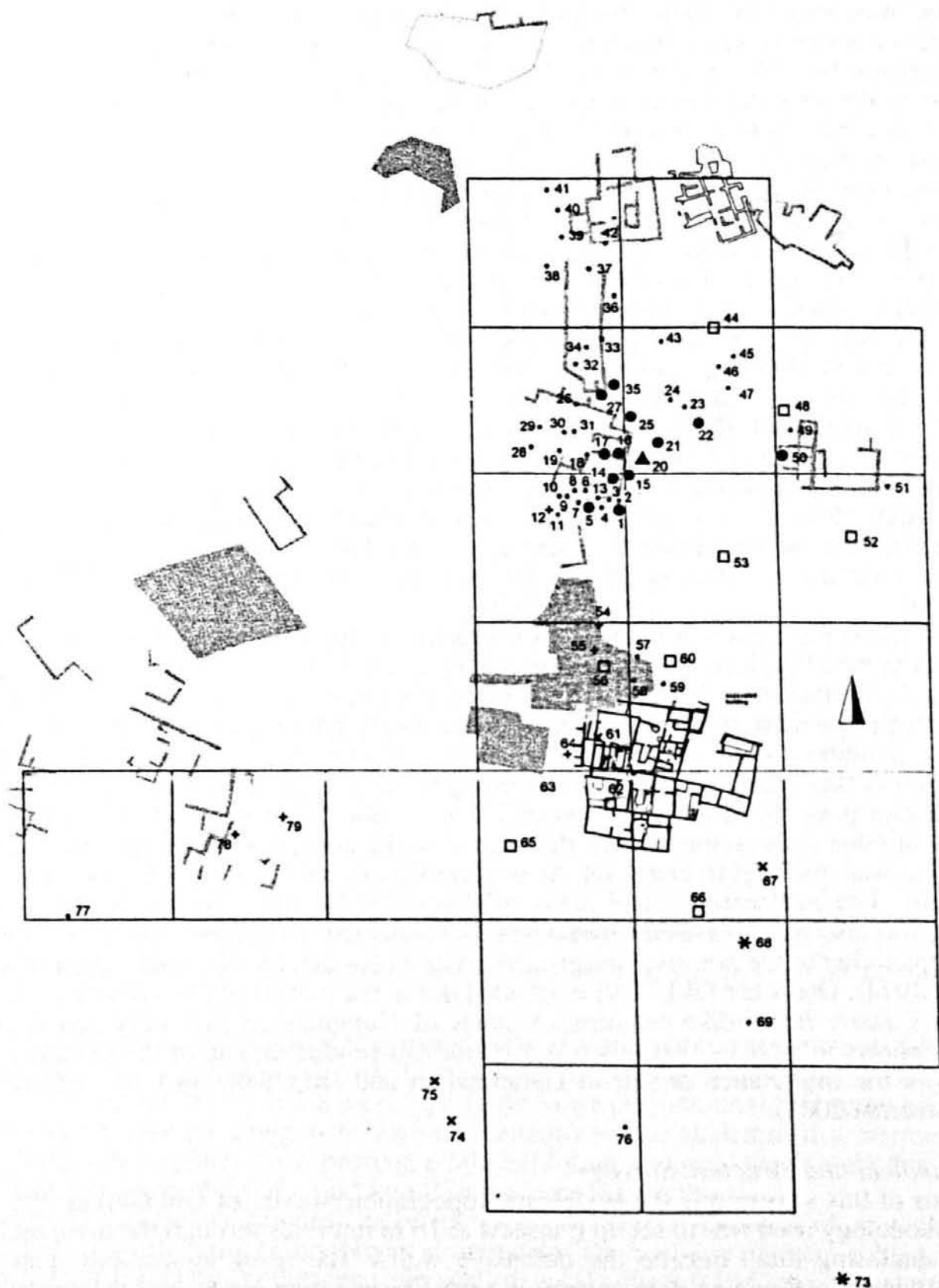


Figure 8. Suspected hearths and industrial features at Saniat Gebril, GER 002. Key: \blacktriangle = excavated hearth; \bullet = dense ash, iron slag and fused sand; \square = ash, slag calcined bone; $+$ = ash and fused sand; \times = ash and calcined bone; $*$ = ash and gypsum. The stippled lines are mudbrick walls visible at the surface, the stippled areas dense zones of collapsed mudbrick. (Survey by S. Hay, J. Preston and I. Schröder-Kolb.)

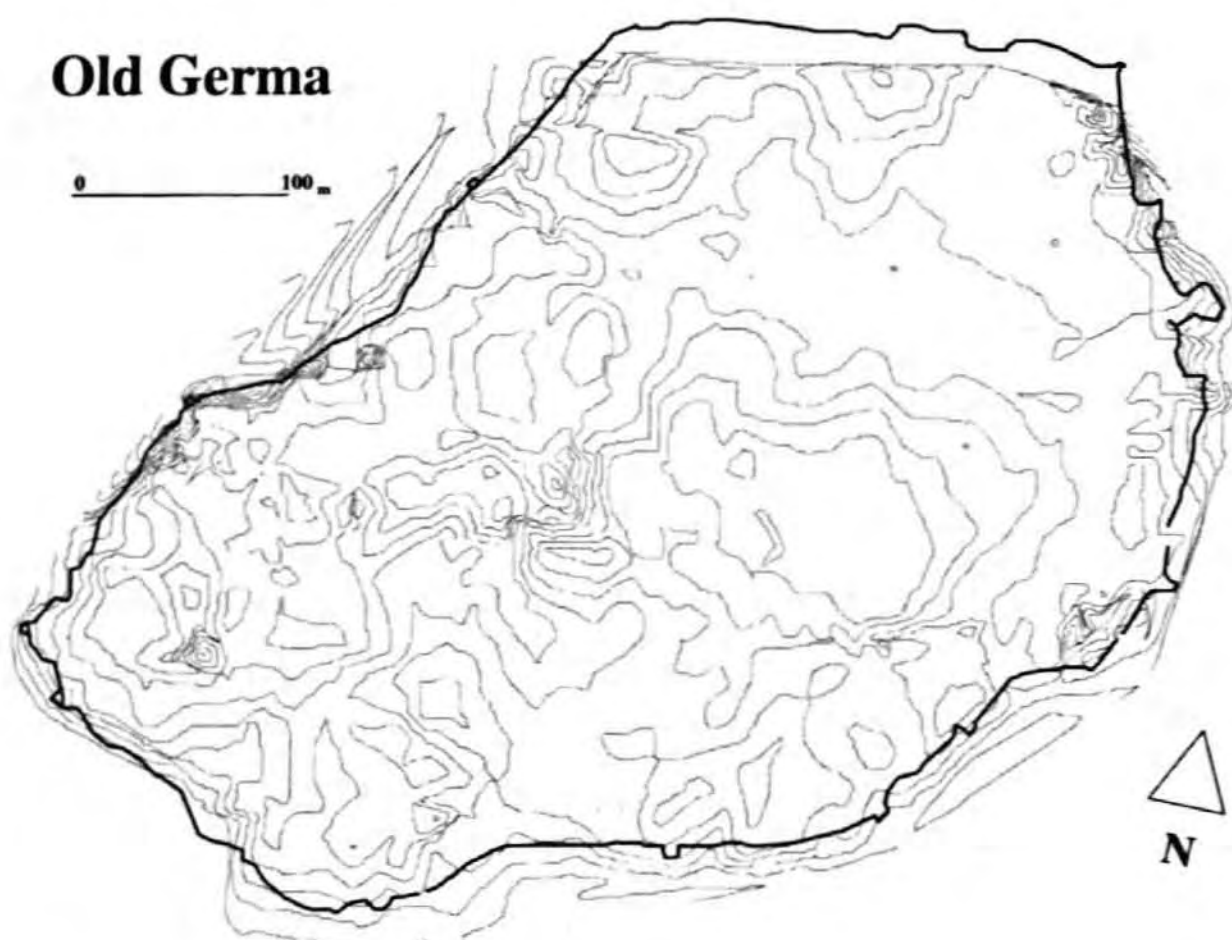


Figure 9. Topographical survey at Old Germa. (Survey by S. Hay and J. Preston.)

Garamantian levels in site G1 and the highest elevation around the kasbah. Some radio-carbon dates are now available for some of the higher-status structures in these areas, which provide a series of *terminus post quem* dates for major developments (see below, *Dating of Sites*).

A number of structures were re-surveyed around the area of the present excavations and a surface survey of ground penetrating radar transects was undertaken to assist in the interpretation of below-ground signals which may relate to the large defensive wall (GER 001.005) running north-south in front of Building 3.

Additional surveys were carried out in the environs of Old Germa, for instance, at GER 004, where four distinct areas of mudbrick were planned (perhaps representing a large defensive wall with towers or a series of isolated defensive structures or *qsur*). At the specific invitation of the Controller of Fezzan, Dr Ali Abdusaleem, a small team also visited Zuila in eastern Fezzan to assist him with the recording of the archaeological sites there.

An analysis of loose architectural stones was undertaken, relating to the Garamantian period and incorporating pieces recovered by Ayoub, Daniels and during the present excavations. Preliminary results of this demonstrate a distinct Hellenistic and Roman influence on architectural style with a particular preference for volute capitals and double torus bases as demonstrated on the Qasr Watwat mausoleum. With detailed measurements of these loose stones and the structures they were recovered from it is now possible to produce some hypothetical elevations. Calculations for the façade of Building 3 seem to suggest that in the second stone-built phase there was either a portico of eight columns or a porch of four columns with entablature above.

Finds work

Archaeobotanical Sampling

Old Germa/Saniat Gebril. The intensive sampling strategy was continued as in previous seasons. A total of 96 bulk samples was taken for the recovery of plant macrofossils (seeds and chaff) and wood charcoal. A further five samples of ashy deposits were taken for the investigation of phytoliths or silica skeletons. Bulk samples were taken where possible from all secure contexts: room fills, pit fills and other discrete features. In addition one bulk sample and four sub-samples were taken from a hearth at Saniat Gebril to investigate fuel and possible metallurgical residues.

Where possible the volume of deposit processed for bulk samples was 10 litres, although sample volumes ranged from 2.5 to 10 litres. All samples were first dry sieved through a 0.5 and 2 mm sieve. Sub-samples were retained unsieved from selected samples for the investigation of phytoliths. The 2 mm fraction was first sorted by eye for the retrieval of charred remains, bones, pottery and small finds. A large number of beads and glass fragments was recovered by this method. The remaining 2 mm materials and the 0.5 mm fraction were then processed by bucket flotation, in which water is added and the organic content is held in suspension and washed over into a sieve. The resulting flots were collected in a 0.5 mm sieve while the heavy mineral component (the residue) was collected in a 2 mm sieve. Both flots and residue were allowed to dry. Flots have been brought back to the UK for full assessment and analysis.

Provisional observations suggest that several samples are very rich indeed and offer great potential for analysis. The plant remains are mostly charred although some desiccated material is also present. As in previous years, the assemblages are dominated by date stones (*Phoenix dactylifera*) and cereal grains, notably barley (*Hordeum vulgare*). Other significant finds include a fish vertebra and an olive stone (*Olea europea*) from two separate samples. These are the first secure finds of either fish bone or olive and it is significant that they were recovered from Garamantian levels where they accompany a general increase in the wealth of material culture. Both fish and olive are characteristic Roman food items and may represent influence from Tripolitania. The fish must have been imported from the coast, presumably as dried or preserved fish (in an amphora). It is not possible at this stage to establish if the olive was cultivated locally or imported as preserved fruit. It is hoped that the examination of the charcoal may shed light on this. Grain of emmer wheat (*Triticum dicoccum*) was noted in one sample. This may suggest that the shift from emmer wheat to bread type wheats as the principal wheat varieties cultivated may have occurred after the move from Zinkekra to the site of Old Germa. This change in wheat cultivation is significant and is recorded across Egypt and much of the Mediterranean in the first millennium BC.

Zinkekra (ZIN 002.13). A visit was made to trench 13 on the lower northern slope of Zinkekra, originally excavated and sampled by Charles Daniels. A small section of the trench between the first phase wall and the later retaining wall was reopened and the section re-examined. The section consisted of alternate organic/dung-rich deposits and sterile collegial/wind blown or rubble deposits, with an organic-rich compacted floor surface at the base, presumably representing the earliest occupation horizon in this part of the site. Six samples were taken from the floor surface and organic rich deposits both for the investigation of the plant remains and for the recovery of dating material to enable AMS dating of the site. The samples have been dry sieved through a 0.5 and a 2mm sieve.

Pottery

The principal aims for this season were the completion of the analysis of pottery data from the Fezzan Project surveys, along with further work on the fabrics catalogue (mainly coarse ware and amphorae). In addition, final arrangements were made for the publication of the pottery typology, obtained by the integration of the Daniels archives and of the type series created in the previous seasons.

The recording of new sites located in the sand sea (around palaeolake deposits) has revealed a larger number of prehistoric settlements. The study of the 'Pastoral' pottery collected from these sites is still at an early stage and further work on the fabrics and the decorative elements is necessary.

Generally all the Garamantian sites yielded a large range of pottery types, mainly represented by handmade ceramics, followed by amphorae and the imported coarse wares. The coarse wares have been subjected to detailed analysis, with the aim of identifying the types attributable to Tripolitanian production. The finewares are primarily of African origin, ARS and TRS.

The second part of the season was directed towards the processing of the pottery found in the excavation of Germa (G1) from both the current and previous years. In total, 7287 sherds were processed, of which 82.15% were of handmade local pottery, 11% amphorae, 4.15% painted handmade ware, 1.70% coarse wares and 1% fine wares. The majority of the handmade local pottery is characterised by globular jars. Small bowls are also recorded, but in lower quantities. Several sherds can be attributed to the frying pan shape (*doka*), which is almost totally absent in the later phases. The different range of forms recorded principally in phases VI and VII seems to suggest a change in eating habits.

The painted ware is represented essentially by two types. The first is a large jar with slight handles, decorated on the neck with red parallel lines and on the body with a white surface and incised lines (recorded by Daniels principally from Roman-period contexts). The second is a jar with red crossed lines on the neck, and sometimes a cord decoration on the rim, again dated to the Garamantian period by Daniels.

The amphorae represent almost exclusively Tripolitanian production, except for the presence of some fragments attributable to late Roman amphorae of Eastern Mediterranean origin. Flagons similar to the types found in the Libyan Valleys survey have also been recorded (Dore 1996, 362). A high proportion of the coarse ware sherds are from casseroles, produced probably in Tripolitania in Roman times (see Dore 1996, 386). Only two fragments (large flanged bowls), in the contexts processed up to now, are attributable to the earlier Punic types.

A very small number of fine ware fragments has been recorded, even though the quantity is considerably increased in the contexts related to phases VI and VII (late Garamantian and Garamantian date). Two fragments of eastern sigillata, one of Italian sigillata and three fragments of thin wall bodies have also been found. The ARS forms are mainly represented by the earlier types (principally Hayes 3, 8), characterised by the A production of northern Tunisia. Fragments of TRS have also been recorded, always in small quantities. No fragments of African kitchen ware have come from the excavation, though the presence of this class is attested by a fragment collected on the surface of the site (Hayes 27 = Lamboglia 9A).

Finally, the pottery found in the excavation of G3 in the last season, in the mosque area, has been processed. Total sherds number 214, of which 95% are handmade local pottery. Forms are principally represented by casseroles and simple lids. Generally the types here recorded refer to the medieval and post-medieval period. Residual ceramics account for only 0.8% of the total assemblage, contrasting with the evidence from the upper layers of the excavation of G1, where residual material was present in a considerable number and size (Mattingly *et al.* 1998b, 136).

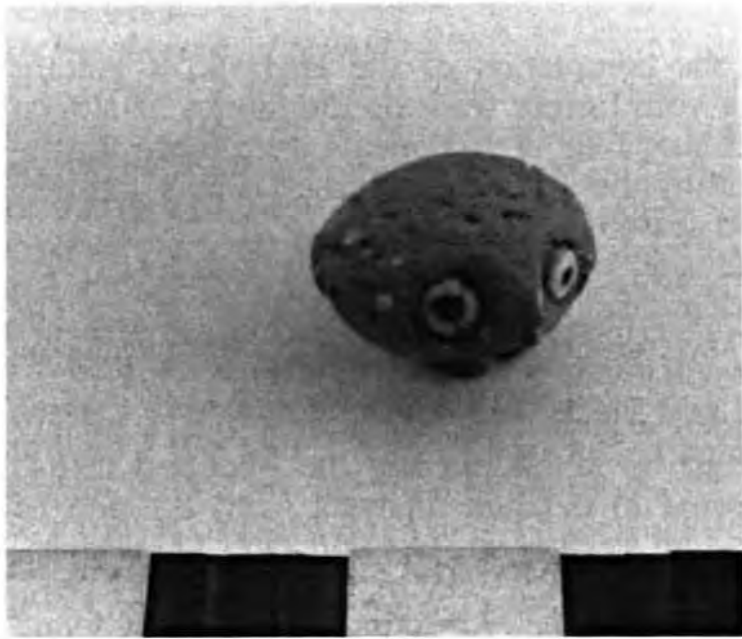


Figure 10. Garamantian figurine head from Old Germa excavations (scale in cm). (Photo: T. Savage.)

The chronology proposed refers to the typology elaborated from the Daniels archives in a previous phase of the work by John Dore and John Hawthorne (Edwards *et al.* 1999, 120–25). The data support the view of Fontana (1995) that imports from the Mediterranean reached a peak in the first and second centuries AD, but also indicate that some trade continued into late antiquity.

Small finds

The work on small finds this season was divided into two main parts: the study of material from the survey for publication and the processing and conservation of incoming objects from the excavation. As lower levels were reached it became clear that the number of significant finds had increased

phenomenally; 1100 numbers were issued comprising more than 2000 individual artefacts, more than doubling the number of such finds recovered in the previous four seasons. Large quantities of worked carnelian were recovered, particularly from a series of pits, and also large quantities of amazonite—a turquoise stone—in an unworked state. Metal continued to be recovered in small quantities. A number of copper alloy rivet plates, similar to those found during survey at Saniat Gebril came in from the Garamantian levels, along with an iron spearpoint. Beads were recovered in large numbers: ostrich eggshell, faience, glass and stone. The glass beads included a bilaterally flattened disc type not seen previously. An important discovery was a large faience (thick glazed earthenware) bead with eyes marvered to the surface.

Figurines

Thirty objects, mostly of baked clay, were recovered from a variety of contexts. Some are clearly zoomorphic and some anthropomorphic in form. A small number may perhaps be categorised as ornithomorphic (birdlike). A number of clear animal torsos is represented. One has the representation of a harness or tether on its neck, while two torsos have incised cross marks. Further detailed study of the figurines will, perhaps, shed light on the species of animal represented. Our preliminary inspection has identified a range of animals depicted including horse, cattle and camel. How these portable images relate to those depicted in known rock art of Garamantian date is an important question warranting further investigation.

At least four heads of probable anthropomorphic form were recovered. One head has inset eyes of faience beads, with a pinched nose (Fig. 10). This and others have incised or stippled decoration possibly representing hairstyles.

A further category of objects comprises what appear to be limbs and animal horns, more work is required to try to match these elements with the torsos recovered. All the objects can be categorised as figurines, with the exception of a larger possible camel head that appears to be a statuette (that is, less portable). All the figurines are highly stylised and will offer an important window on the Garamantian system of visual communication.

They compare in sophistication and craftsmanship with early figurines found in the Near East and Europe.

The Worked Stone

Approximately five hundred objects of worked stone have been catalogued during this season. The majority of these are rotary querns. At least ten types have been distinguished, seven variants of upper grinding stones and three lower. A detailed study of these will be done and it is hoped that it will be possible to put them into some dating sequence.

The other most interesting group of finds studied were those with evidence of ochre/haematite grinding. Several mortars, pounders and even a rotary quern have traces of an orange/red substance on their surface. An example has been taken for analysis. A potential source for this substance was found within the Germa region this season.

Lithics

The 2001 season has concentrated on processing the material from two sources, the geographical and environmental survey. The first category of material comprised a series of random grab samples at locations associated with potential palaeolakes. The samples were collected to provide broad chronological guidance for when the lakes may have been present. The material gathered this season has been more representative as certain smaller elements, previously absent from collections, have now been retrieved. This has had the effect of filling in the gap at the beginning of the Holocene sequence, where bladelet-based industries had formerly appeared lacking. Most of the sites located are in the Edeyen Ubari (EDU) region and are also usually associated with both earlier (Pleistocene) materials and those from the middle Holocene. It would appear that on the lake edges furthest from the escarpment the earlier Pleistocene sites provided a convenient source of raw material for later activities. Thus a few worn Acheulean, Mousterian or Aterian pieces often remain amongst a scatter of Holocene flakes and blades. One example of this reuse of materials is at EDU 005 where worn pieces show later retouch. Another example occurs within the main Wadi at GER 002 where an Aterian tanged piece has been retouched into an endscraper retaining the tang. This conservation of raw materials continues within the Holocene where broken polished axes usually show subsequent flaking to keep the tool in use and then, once reduced beyond an effective size, to produce small flakes and blades. The EDU 005 site also shows this effect.

The palaeolakes survey has continued to increase the numbers of Pleistocene sites identified. There are a series of bifaces, usually amygdaloid in form, from EDU 005, TIN 046, TAB 030 and EDU 023. The number of Aterian sites has also increased with pieces from EDU 018, EDU 022, EDU 005. There are a number of 'Mousterian' tools including points, sidescrapers, notches, denticulates and limaces. These pieces could, however, be Acheulean, Mousterian or Aterian in date and form a general background scatter to the Pleistocene exploitation of the region.

There is a gap for the final Pleistocene and sites reappear in the early Holocene, with bladelet-based industries around the palaeolakes. A well-made series of backed bladelets, including pointed forms was recovered from EDU 005. A small number of crescents was also found. Typical bladelet cores are rare and only one was collected this season.

The Mid-Holocene is well represented by a number of small bifacial foliates points and rough-outs, by scrapers, borers and various forms of projectile point. The range in projectile point forms collected by the project is now significant and could benefit from any wider, more regional study that creates a type series. The forms collected this season include triangular, hollow-based with serrated edges, barbed and tanged, tanged bifacial

and unifacial. Outstanding amongst them is a bilaterally notched barbed and tanged arrowhead in red flint with burination resulting from a possible impact fracture. This range of points spans the Middle–Late Pastoral phases.

In addition to the points, a range of axes has been recovered. These are a mix of flaked, polished and flaked/polished axes and are mostly fragmentary. Many have been reused as cores. There was a single flaked bifacial pick similar in form to that found on the Hamada last year.

Dating of Sites

As part of the work of the Fezzan Project (1997–2001), numerous organic samples (mostly carbonised wood and seeds) were collected from both the excavation and from survey of a range of buildings in the Project zone. Funding was sought from a variety of sources to establish a programme of radiocarbon dating of these samples using the most accurate commercially available method. Thanks to recent advances in experimental method the archaeologist now has available two basic approaches to obtaining dates from samples of organic materials (charcoal etc.). The first method is radiometric dating (essentially a refined version of traditional C_{14} dating), relying on measuring the state of radioactive decay in the samples. With this method, quite large quantities of organic material are required for each sample (which often involves mixing a range of organic material from the context, not all of which may have the same age) and it is necessary to calibrate the raw data returned by the laboratories by reference to an established calibration curve. The second method, which gives more accurate dates on smaller sample sizes, is called AMS dating (Accelerator Mass Spectrometry). The chief advantage of this method is that it can date very small individual pieces (to the size of a single seed), so the result, though still requiring calibration and thus providing a bracket of possible dates, is less liable to be distorted.

With funding from LASMO GML, the Society for Libyan Studies and the ORADS scheme sponsored by the NERC and run through the Oxford Radiocarbon lab, a suite of 26 samples have already been processed and a second suite of 24 samples are currently undergoing processing. The full list of dates will be published in a separate report, but a few comments are offered here. All dates quoted are based on the bracketed and calibrated dates.

The current batch of results can be divided into two broad groups. The first group comprises a series of dates for specific structures at Old Germa, the medieval mudbrick city overlying the Garamantian capital. Samples were taken from a number of key standing structures to help fill out the chronology of the post-Garamantian history of the site. The second batch of dates relates to wider survey work within the Wadi al-Ajal and the Wadi Barjuj/Wadi 'Utba area, many of which are from defensive structures (*qsur*) which have generally been assumed to be Islamic in date.

One sample was taken from an early level of the Garamantian city of Old Germa (FP04). This suggests that the foundation of the Garamantian city took place around the fourth-third centuries BC. A presumed late antique defensive wall overlies levels, dated by two separate samples (FP05/06), to the first-third centuries AD. It is probably mid-late Garamantian (third/sixth century) and it could be later still. This wall is overlain by the remains of a suspected mosque (sample FP25) and the date obtained for this structure, in the eleventh or twelfth century AD, fits very well with the interpretation (for the identification of the mosque, Mattingly *et al.* 2000, 106–7). Two dates (samples FP01/03) relate to the medieval wall circuit. The first, from an organic inclusion in a mud brick, suggests a date before AD 1000, which, whilst not beyond the bounds of possibility, seems rather early. It may be the result of the incorporation of earlier material in the brick. At any rate

it shows that the walls must post-date the eighth century and also that there was occupation/activity at Germa in the period between the fifth-sixth century and AD 1000. The second sample relates to a D-shaped tower added at a secondary stage to the wall circuit and suggests a date between the late fifteenth and late seventeenth centuries. Material from the kasbah (FP08/24, an organic inclusion in mud brick, and a timber fragment from a tower) gives a consistent date centred on the fourteenth-fifteenth centuries. Finally, the later of two dates from below the foundation of the piers of the southern mosque (FP07a/b) provides a *terminus post quem* for its construction in the thirteenth century AD.

The dates from survey sites include a sample from a Garamantian escarpment edge settlement south of Ubari at Tinda (FP02a/b), which indicates a date in the latter centuries BC. This shows that there was overlap in the dates of occupation of the defensively oriented escarpment edge sites and the wadi-centre 'towns' like Germa. A large batch of dates relate to defensive structures, mostly the castle-like buildings commonly called *qsur* and hitherto undated. The most important of these relate to two sites tentatively identified as Garamantian towns, Qasr Bin Dourgba in the eastern Wadi al-Ajal and Qasr ash-Sharaba in the Wadi 'Utba. The AMS dates from the mud brick outer wall and *qasr* at the former (FP09/10) and from one of a series of fortifications within the urban area at the latter (FP20-22) indicate that the fortified elements at this site probably date to the late Garamantian period. At Qasr ash-Sharaba, the series of three dates from different contexts confirms the impression gained from visual inspection that occupation continued into the post-Garamantian period. The latest of the three dates (eleventh to early thirteenth century AD) provides possible confirmation that this site is the town known to al-Idrisi (in Levtzion and Hopkins 1981, 120) in the twelfth century as Tasawa (the modern village of that name is now 15 km distant with the retreat of the oasis zone). Close to Qasr Sharaba is the site of Qasr Mara, a stone-footed mud brick tower, showing signs of some modification over time. The sample from a mud brick gives a date in the late fourth-late sixth century.

Several other *qasr* sites provided dates in the late Garamantian period, though in view of the excellent preservation of some of these structures an Islamic date had been anticipated in at least one case. TAG 011 (FP23) is a Garamantian village with central *qasr*, though the very early date from a mudbrick sample (third century BC-first century AD) suggests the possibility of inclusion of earlier organic matter. Qasr Budrina (FP17), and two other *qsur* in the region of Leksair and Budrina (FP15/18) have all yielded dates similar to Qasr Mara in the third-sixth centuries AD. Taken at face value, these add to the impression that the late Garamantian period was characterised by an increasing concern for the construction of defensive structures on their settlement sites. It is also possible that some of these may be later structures, incorporating residual organic material in their mudbrick mix from earlier phases of occupation. Even if that were the case, however, we appear to have confirmation of Garamantian-period occupation at many of the sites of standing *qsur*.

A further group of dates relates to *qsur* and other structures of unquestionably later date. LEK 18 (FP13) and TEK 10 (FP11) were selected as examples of *qsur* within settlements with mosques. The former site appears to date to the fifteenth-seventeenth century, while the latter has produced a date of the tenth-eleventh century. Towards the east end of the wadi there is a group of stone-built villages and *qsur* (FP14/16) and dates from two of these confirm the comparatively recent origins of these sites (sixteenth-seventeenth century and fourteenth-fifteenth century).

The final date comes from the infill sequence of one of the irrigation channels (*foggaras*) in the Wadi al-Ajal. Unfortunately, the charcoal sample taken appears to have been of relatively recent date, whereas we had hoped for an earlier date from this

sample. It is by no means certain that water was still flowing consistently in this feature at so late a date (since the sample was taken below an open shaft the material could have got into the *foggara* channel fill at a date some time after the feature ceased to function effectively).

This first set of AMS dates can without exaggeration be said to have transformed our knowledge of the Garamantian and post-Garamantian settlements of the Wadi al-Ajal and neighbouring regions (for a summary of previous views on the Garamantes, see Daniels 1989; cf. Mattingly 2000a/b). The second suite of dates currently being processed will help to fashion an absolute chronology for the post-Garamantian phases of the current excavations at Old Germa (as well as providing data on the changing pattern of crop cultivation in the region). Following the success of the method, further samples have been collected from other survey sites for future dating, should funds be available. A limited number of AMS dates is required for the lowest levels of the Germa excavations explored during the 2001 season.

Publication plans

During the season, further progress was made towards the completion for publication of a series of reports on the survey work carried out by the Fezzan Project, linked to the earlier survey and excavation work of C. M. Daniels. It is anticipated that the first of a projected series of volumes will be ready for the press in the course of 2001. The provisional title for the series is *The Archaeology of Fazzan*, with volume 1 comprising a synthesis of the available data; volume 2, a site gazetteer, a draft pottery type series and finds catalogue from the survey work; and volume 3, the results of the excavations carried out by Daniels at Zinkekra, Saniat Gebril, Saniat Ben Howedi and other sites (Mattingly *et al.* forthcoming a/b/c). The current excavations and survey at Germa will be the subject of a fourth volume, once post-excavation work is completed.

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The team in the field consisted of: Professor David Mattingly (Director of the Fezzan Project and Chairman, Society for Libyan Studies), Dr Nicholas Brooks (Leverhulme Research Fellow—Remote Sensing studies), Franca Cole (archaeological conservator/finds specialist), John Dore (ceramicist and Head of Mission, Society for Libyan Studies), Dr Nicholas Drake (arid zone geographer), Sophie Hay (archaeologist/surveyor), Anna Leone (ceramicist), Dr Susan McLaren (arid zone geographer), Paul Newson (archaeologist), Jon Orchard (archaeologist), Holly Parton (finds specialist/stone artefacts), Ruth Pelling (archaeobotanist), James Preston (archaeologist/buildings surveyor), Dr Tim Reynolds (lithics specialist), Toby Savage (photographer), Dr Irene Schröfer-Kolb (archaeometallurgist), David Thomas (archaeologist/chief excavation assistant director), Adrian Tindall (archaeologist/excavation assistant director), Dr Andrew Townsend (archaeologist/excavation assistant director), Dr Kevin White (arid zone geographer). We employed a team of 12-15 workmen (20 different men over the course of the season), plus two cooks.

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